Linear Transformations Worksheet

SHAPE	Mean	St. Dev.	Min	Q1	Med	Q3	Max	IQR	Range (#)
left sk	30.2	6.95	12	26	30	36	40	10	28

SHAPE	Mean	St. Dev.	Min	Q1	Med	Q3	Max	IQR	Range (#)
left sk	30.2	6.95	12	26	30	36	40	10	28
left sk	40.2	6.95	22	36	40	46	50	10	28
left sk	60.4	13.91	24	52	60	72	80	20	56
left sk	80.4	13.91	44	72	80	92	100	20	56

4) In general: if we multiply every value by constant (a)

Mean
Med
Quartiles
Std. Dev
IQR

$\times a$

mult/div. – change everything

4) In general: if we add constant (b) to every value

Mean $+b$
Med $+b$
Quartiles $+b$
Std. Dev same
IQR same

$+b$ only change measures of center

Example from worksheet: (#6)

	-12	x3	+10 then /2
Mean = 20	8	60	15
Med = 25	13	75	17.5
Q1 = 18	6	54	14
Q3 = 32	20	96	21
S = 4	4	12	÷2 2
IQR = 14	14	42	÷2 7

Linear Transformations Practice worksheet

Linear transformations:

Adding/Subtracting a number (+b) to a list of data changes....

1. measures of center are + b (Med, mean, quartiles) *and individual observations

2. Does not change the measures of spread

EXAMPLE:

	mean	st. dev.	Min	Q_1	med	Q_3	max	IQR	Range
Original	15.2	2.6	2	8	14	18	25	10	23
+12									
-7									

	mean	st. dev.	Min	Q_1	med	Q_3	max	IQR	Range
	15.2	2.6	2	8	14	18	25	10	23
	27.2	2.6	14	20	26	30	37	10	23
	8.2	2.6	-5	1	7	11	18	10	23

Multiplying/Dividing a number (*a) to a list of data changes...

1. The measures of center are x a

2. the measures of spread are x a

	mean	st. dev.	Min	Q_1	med	Q_3	max	IQR	Range
Original	15.2	2.6	2	8	14	18	25	10	23
x 1.2									
÷ 2									

	mean	st. dev.	Min	Q_1	med	Q_3	max	IQR	Range
	15.2	2.6	2	8	14	18	25	10	23
	18.24	3.12	2.4	9.6	16.8	21.6	30	12	27.6
	7.6	1.3	1	4	7	9	12.5	5	11.5

Complete the Practice problems

#1

	mean	st. dev.	Min	Q_1	med	Q_3	max	IQR	Range
ginal	38.5	5.7	12	28	35	41	86	13	74
2	60.5	5.7	34	50	57	63	108	13	74
	154	22.8	48	112	140	164	344	52	296
– 35	196	34.2	37	133	175	211	481	78	444
- 27	36.625	1.425	30	34	35.75	37.25	48.5	3.25	18.5

÷4 ÷4

1) A researcher finds that the mean length of a house cat's tail is 14.65 inches with a standard deviation of 1.36 inches. What would be the mean and standard deviation in cm if 1 in = 2.54 cm?

$\bar{X} = 14.65$ in.
$S = 1.36$ in. $\times 2.54$

1 in = 2.54 cm.

$\bar{X} = 37.211$ cm
$S = 3.4544$ cm

1) A friend in Sao Paulo, Brazil laughing told Mr. Wheeles that it averages 27.2° with a standard deviation of 1.6° and he was going to the beach. Confused at first, Mr. Wheeles remembered that temperature is measured in Celsius in Brazil. If the equation to convert Celsius to Fahrenheit is F = (9/5)*C + 32 what is the mean and standard deviation for the temperature in Brazil on February 21?

$\bar{X} = 27.2°C$
$S = 1.6°C$

$F = \frac{9}{5} \cdot C + 32$

$\bar{X} = \frac{9}{5}(27.2) + 32 = 80.96°F$

$S = \frac{9}{5}(1.6) = 2.88°F$

1) A company selling clothes on the Internet reports that the packages it ships have a median weight of 68 ounces and an IQR of 40 ounces.

a. The company plans to include a sales flyer weighing 4 ounces in each package. What will the new Median and IQR be?

Med = 68 oz. $+4$ oz $\rightarrow$ M = 72 oz.
IQR = 40 oz. $\rightarrow$ IQR = 40 oz.

b. If the company recorded the shipping weights of these NEW packages in pounds rather than ounces, what would the Median and IQR be? (1 pound = 16 ounces)

M = 72 oz. $\div 16$ $\rightarrow$ M = 4.5 lbs.
IQR = 40 oz. $\rightarrow$ IQR = 2.5 lbs.

5) Here are the summary statistics for the weekly payroll of a small company:

mean	std dev	min	Q1	Med	Q3	Max	IQR
700	400	300	350	500	950	1200	600

+50

a. Suppose business has been good and the company gives every employee a $50 raise. What will the new summary statistics be?

mean	std dev	min	Q1	Med	Q3	Max	IQR
750	400	350	400	550	1000	1250	600

×1.10

b. Instead, suppose the company decides to give everyone a 10% raise (to do this, multiply by 1.10). What will the new summary statistics be?

mean	std dev	min	Q1	Med	Q3	Max	IQR
770	440	330	385	550	1045	1326	660

6) A high school senior uses the Internet to get information on SAT tests vs. ACT tests. He is looking at comparing the two tests, and knows that SATs are out of 1600 points (math and verbal only), and ACTs are out of 36 points. Since the two exams use very different scales, comparisons of the two are hard. He finds online that an easy way to compare is:

SAT = 40 x ACT + 150.

Here are the summary statistics for ACT scores is his school.

mean	std dev	min	Q1	Med	Q3	Max	IQR
27	3	19	24	28	30	34	6

Find the comparable SAT scores:

mean	std dev	min	Q1	Med	Q3	Max	IQR
1230	120	910	1110	1270	1350	1510	240